**Topic 1: Quantitative chemistry (12.5 hours)**

**1.1 The mole concept and Avogadro’s constant**   
1.1.1 **Apply** the mole concept to substances (2)   
1.1.2 **Determine** the number of particles and the amount of substance (in moles).(3)   
**1.2 Formulas**   
1.2.1 **Define** the terms relative atomic mass (Ar) and relative molecular mass (Mr). (1)   
1.2.2 **Calculate** the mass of one mole of a species from its formula. (2)   
1.2.3 **Solve** problems involving the relationship between the amount of substance in moles, mass and molar mass. (3)   
1.2.4 **Distinguish** between the terms empirical formula and molecular formula. (2)   
1.2.5 **Determine** the empirical formula from the percentage composition or from other experimental data. (3)   
1.2.6 **Determine** the molecular formula when given both the empirical formula and experimental data. (3)  
**1.3 Chemical equations**   
1.3.1 **Deduce** chemical equations when all reactants and products are given. (3)   
1.3.2 **Identify** the mole ratio of any two species in a chemical equation. (2)   
1.3.3 **Apply** the state symbols (s), (l), (g) and (aq). (2)   
**1.4 Mass and gaseous volume relationships in chemical reactions**  
1.4.1 **Calculate** theoretical yields from chemical equations. (2 )   
1.4.2 **Determine** the limiting reactant and the reactant in excess when quantities of reacting substances are given. (3)   
1.4.3 **Solve** problems involving theoretical, experimental and percentage yield. (3)   
1.4.4 **Apply** Avogadro’s law to **calculate** reacting volumes of gases. (2)   
1.4.5 **Apply** the concept of molar volume at standard temperature and pressure in **calculations**. (2)   
1.4.6 **Solve** problems involving the relationship between temperature, pressure and volume for a fixed mass of an ideal gas. (3)   
1.4.7 **Solve** problems using the ideal gas equation, PV = nRT (3)   
1.4.8 **Analyze** graphs relating to the ideal gas equation. (3)   
**1.5 Solutions**  
1.5.1 Distinguish between the terms solute, solvent, solution and concentration (g dm–3 and mol dm–3). (2)   
1.5.2 Solve problems involving concentration, amount of solute and volume of solution. (3)